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**Peddireddy et al.**

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(54) **HANDSET SELF DIAGNOSTICS**

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***H04W 24/00*** (2009.01)

(52) **U.S. Cl.** ..... **455/425**; 455/423; 455/420; 455/418

(58) **Field of Classification Search** ..... 455/418–420, 455/423–425, 550.1–560

See application file for complete search history.

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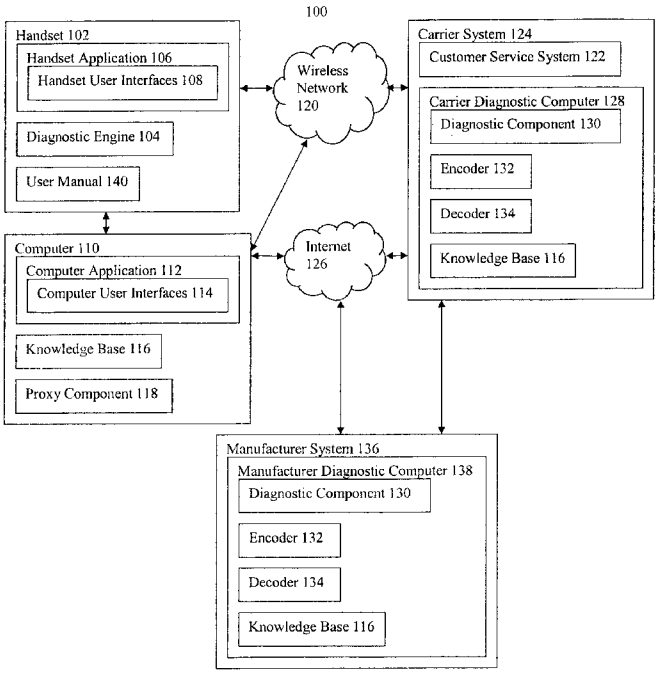
*Assistant Examiner* — Ronald Eisner

(57) **ABSTRACT**

A system for handset self diagnostics is provided. The system includes a handset and a diagnostic engine on the handset to obtain diagnostic data for the handset. The system also includes an application on the handset, and the application includes at least one user interface that uses the diagnostic data to assist a user of the handset to operate the handset.

**20 Claims, 6 Drawing Sheets**



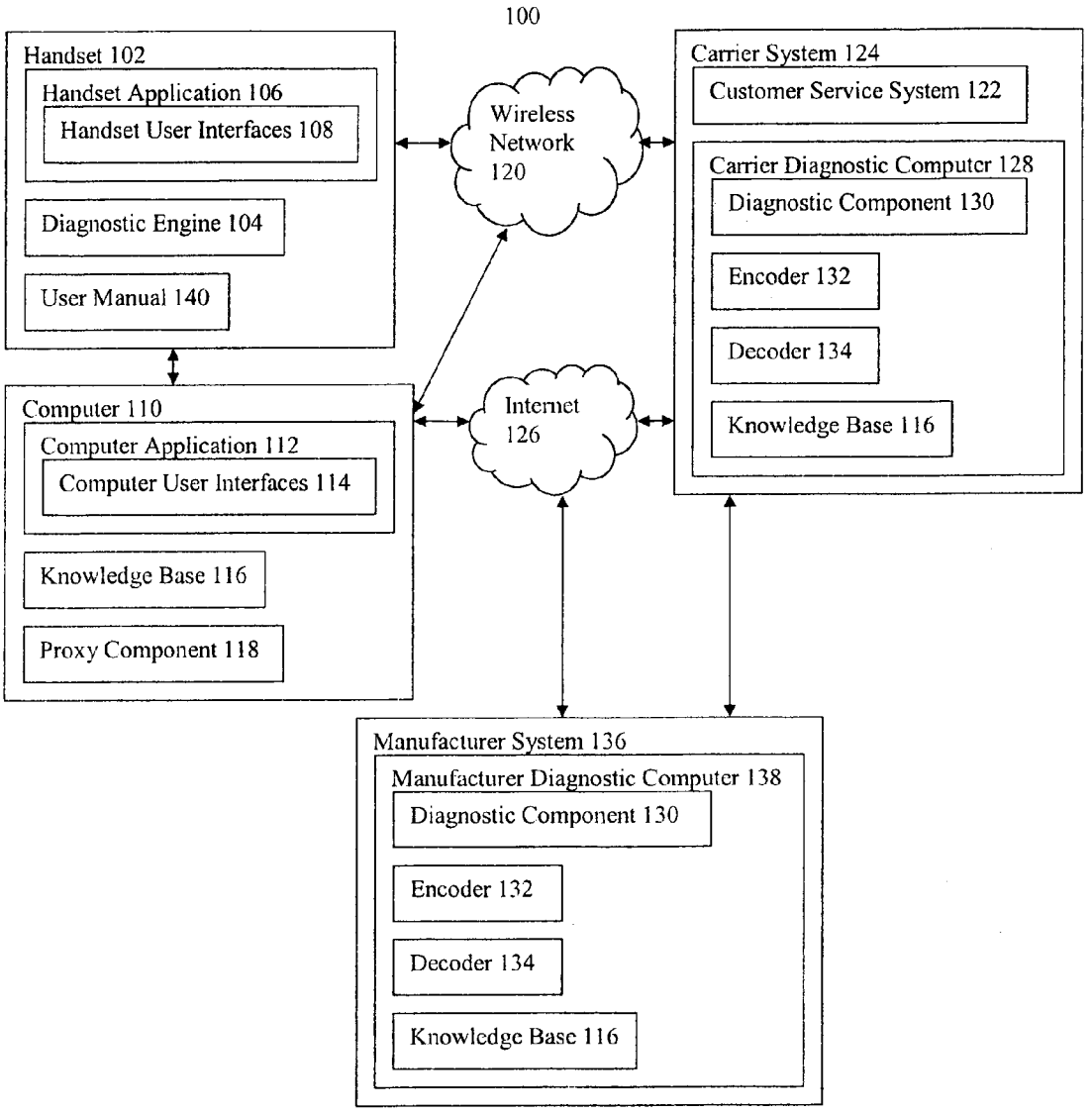

100
Handset 102
Handset Application 106
Handset User Interfaces 108
Diagnostic Engine 104
User Manual 140
Wireless Network 120
Carrier System 124
Customer Service System 122
Carrier Diagnostic Computer 128
Diagnostic Component 130
Encoder 132
Decoder 134
Knowledge Base 116
Computer 110
Computer Application 112
Computer User Interfaces 114
Knowledge Base 116
Proxy Component 118
Internet 126
Manufacturer System 136
Manufacturer Diagnostic Computer 138
Diagnostic Component 130
Encoder 132
Decoder 134
Knowledge Base 116

Fig. 1

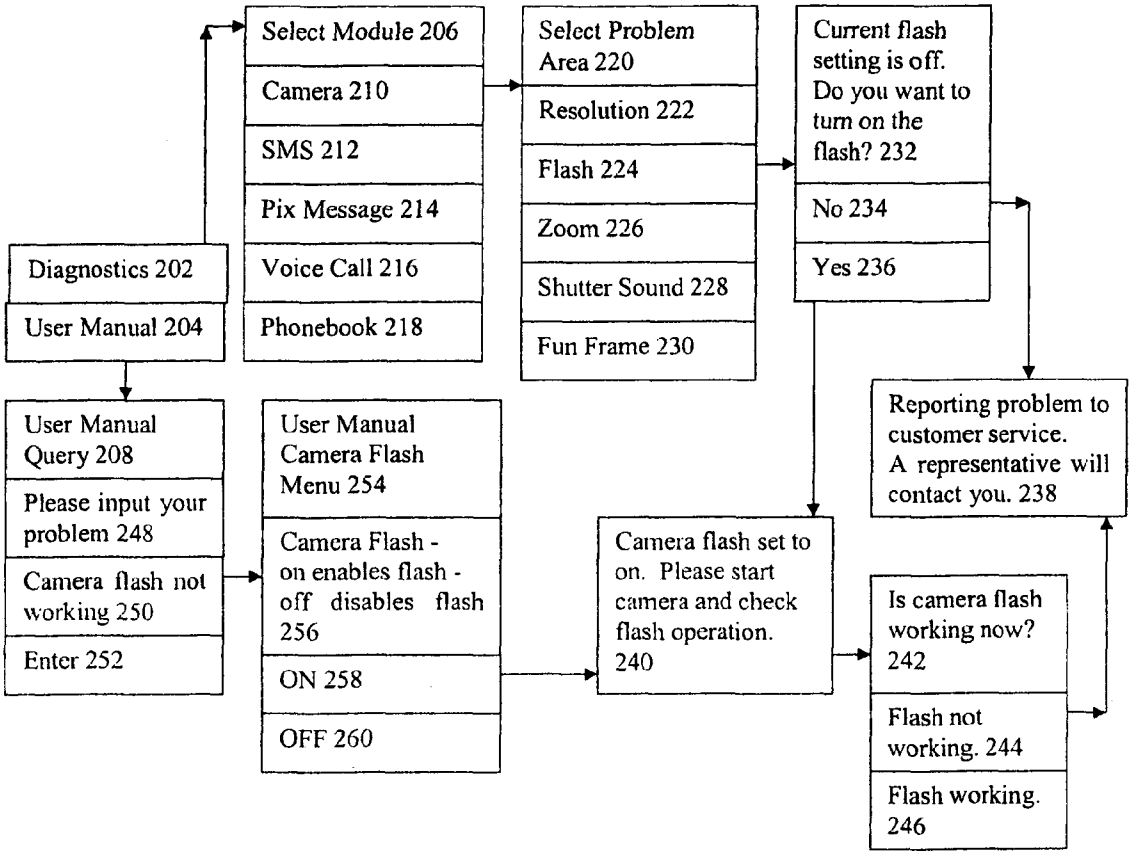

Diagnostics 202
User Manual 204
Select Module 206
Camera 210
SMS 212
Pix Message 214
Voice Call 216
Phonebook 218
Select Problem Area 220
Resolution 222
Flash 224
Zoom 226
Shutter Sound 228
Fun Frame 230
Current flash setting is off. Do you want to turn on the flash? 232
No 234
Yes 236
Reporting problem to customer service. A representative will contact you. 238
User Manual Query 208
Please input your problem 248
Camera flash not working 250
Enter 252
User Manual Camera Flash Menu 254
Camera Flash - on enables flash - off disables flash 256
ON 258
OFF 260
Camera flash set to on. Please start camera and check flash operation. 240
Is camera flash working now? 242
Flash not working. 244
Flash working. 246

Fig. 2

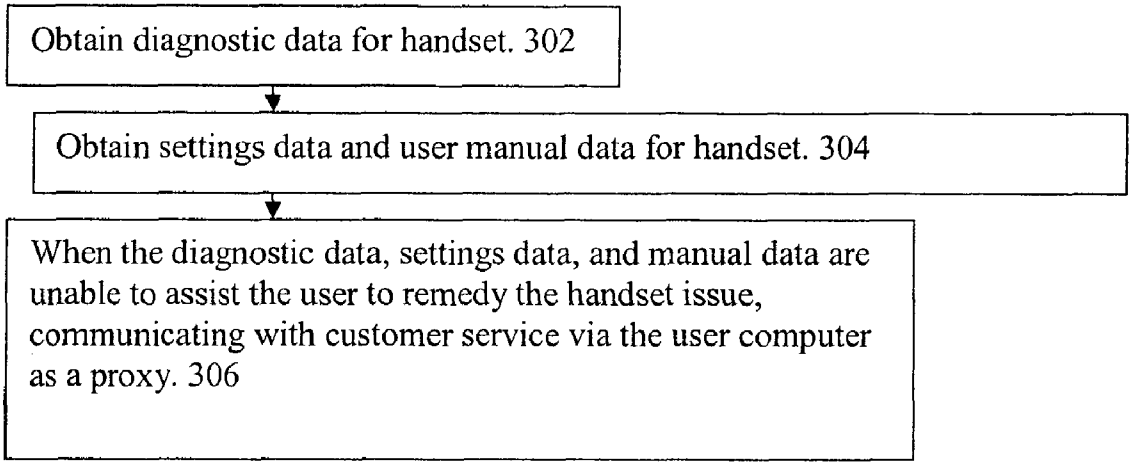

Obtain diagnostic data for handset. 302
Obtain settings data and user manual data for handset. 304
When the diagnostic data, settings data, and manual data are unable to assist the user to remedy the handset issue, communicating with customer service via the user computer as a proxy. 306

Fig. 3

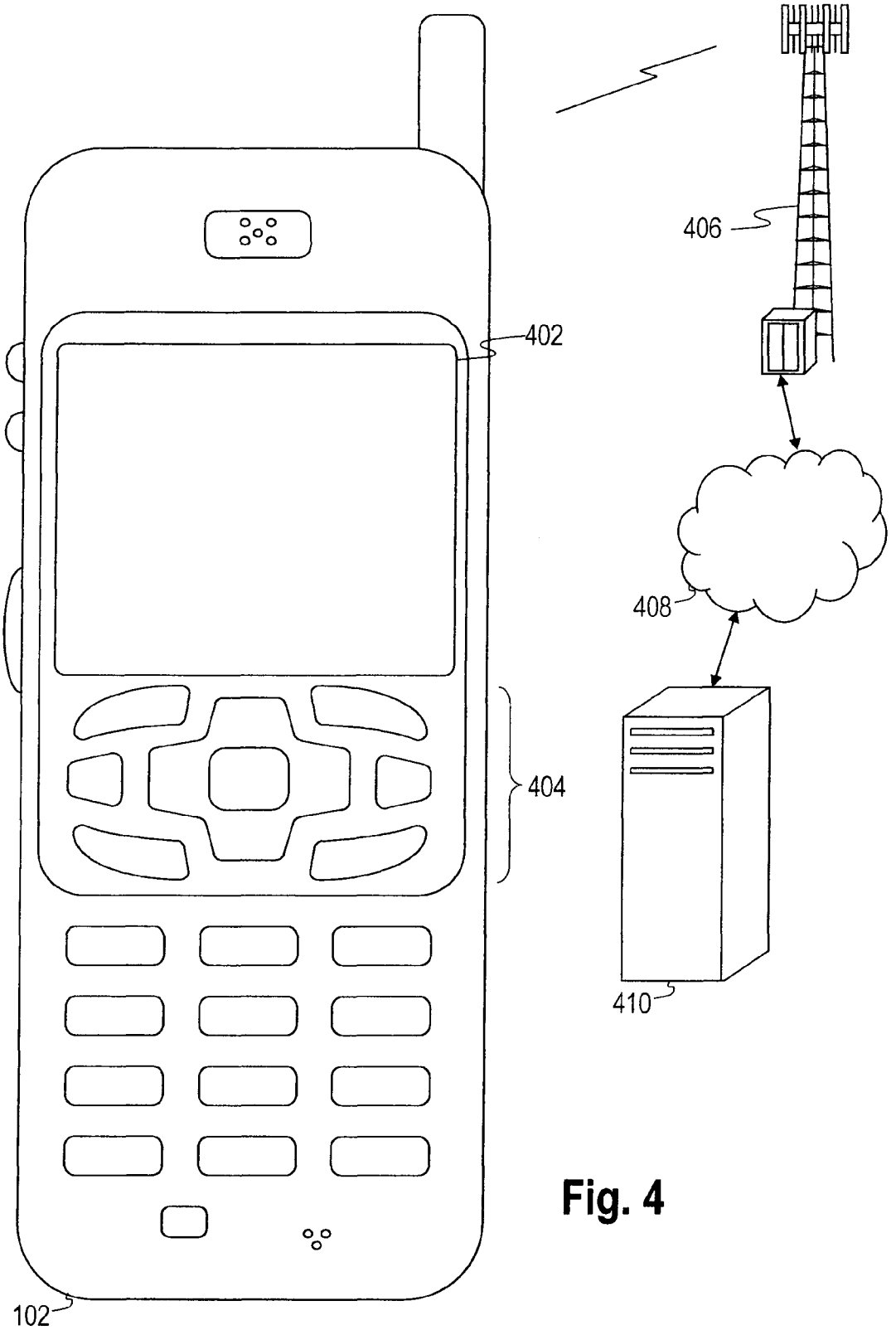



Fig. 4

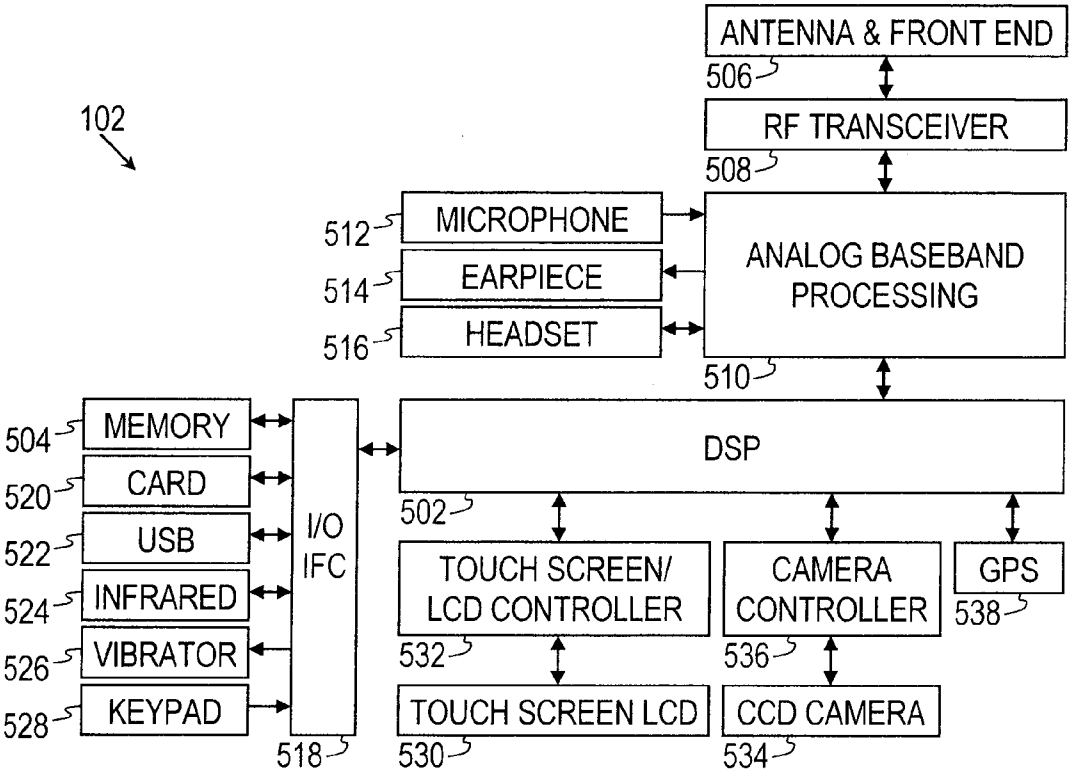

102
ANTENNA & FRONT END
506
RF TRANSCEIVER
508
512
MICROPHONE
514
EARPIECE
516
HEADSET
ANALOG BASEBAND PROCESSING
510
504
MEMORY
520
CARD
522
USB
524
INFRARED
526
VIBRATOR
528
KEYPAD
I/O IFC
518
DSP
502
TOUCH SCREEN/ LCD CONTROLLER
532
CAMERA CONTROLLER
536
GPS
538
TOUCH SCREEN LCD
530
CCD CAMERA
534

Fig. 5

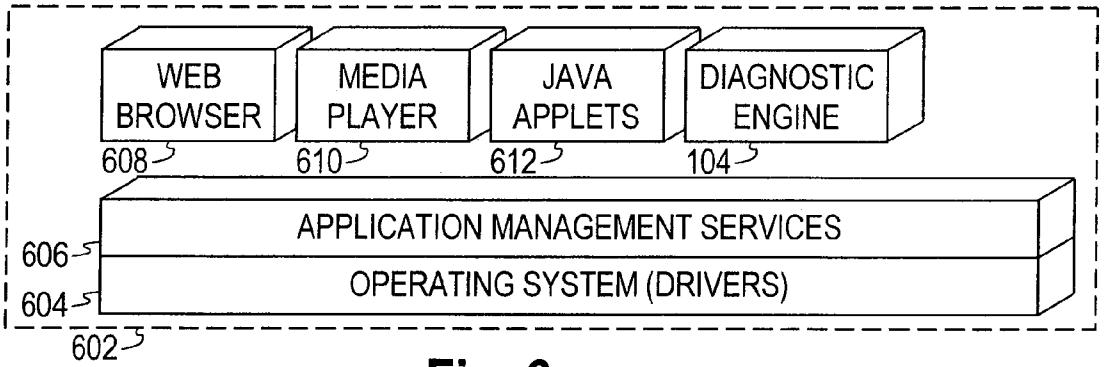

WEB BROWSER
608
MEDIA PLAYER
610
JAVA APPLETS
612
DIAGNOSTIC ENGINE
104
APPLICATION MANAGEMENT SERVICES
606
OPERATING SYSTEM (DRIVERS)
604
602

Fig. 6

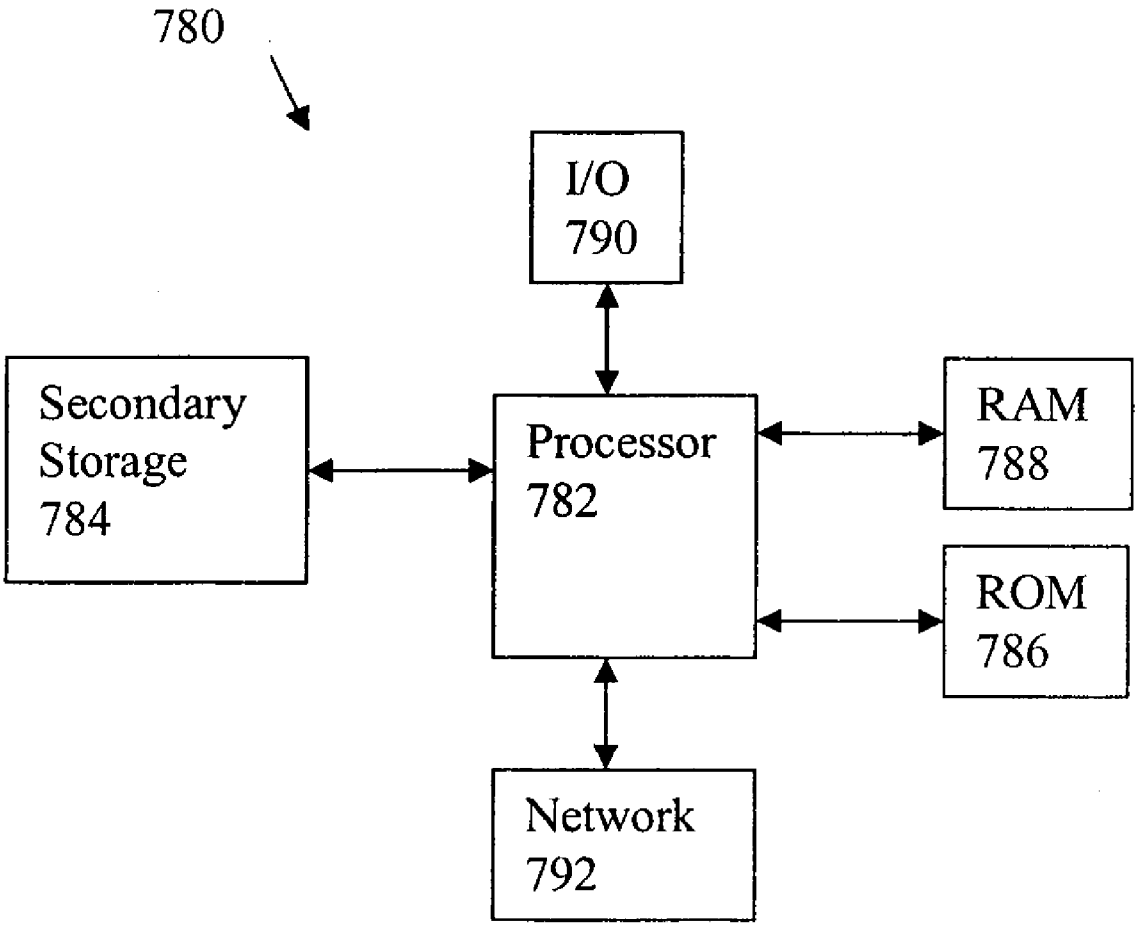

780
I/O
790
Secondary
Storage
784
Processor
782
RAM
788
ROM
786
Network
792

Fig. 7

# HANDSET SELF DIAGNOSTICS

## CROSS-REFERENCE TO RELATED APPLICATIONS

Not applicable.

## STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable.

## REFERENCE TO A MICROFICHE APPENDIX

Not applicable.

## BACKGROUND

A handset may refer to a mobile phone, a wireless handset or telephone, a pager, a personal digital assistant, a portable computer, a tablet computer, or a laptop computer. When a user of the handset needs assistance in operating a handset, the user may contact a customer service center for a telecommunications network carrier. The customer service center may only provide certain assistance to the user, which may be limited when the handset is not physically present at the customer service center. If the customer service center cannot assist the user in operating the handset, the customer service center may send the handset to the handset manufacturer, and may charge the handset manufacturer for the return. Also, customer satisfaction may decrease when the handset is at the customer service center or at the handset manufacturer. Servicing the handset at the customer service center or at the handset manufacturer may create expenses for the network carrier, the handset manufacturer, or both.

## SUMMARY

In one embodiment, a system for handset self diagnostics is provided. The system includes a handset and a diagnostic engine on the handset to obtain diagnostic data for the handset. The system also includes an application on the handset, and the application includes at least one user interface that uses the diagnostic data to assist a user of the handset to operate the handset.

In another embodiment, a system for handset self diagnostics is provided. The system includes a handset operable for use by a user for wireless communication. The system also includes a diagnostic engine to obtain diagnostic data for the handset. Additionally, the system includes an application on a computer of the user, with the computer in communication with the handset. The application includes at least one user interface that uses the diagnostic data to assist the user of the handset to operate the handset.

In yet another embodiment, a method for handset self diagnostics is provided. When a handset is inoperable to communicate via a carrier wireless network, a computer of a user of the handset communicates with the handset. An application is selected using the computer to obtain diagnostic data from the handset to enable the handset to communicate via the carrier wireless network. When the application cannot enable the handset to communicate via the carrier wireless network, the computer of the user is used as a proxy to promote communication between the handset and a customer service system of the carrier to attempt to resolve the issue.



These and other features and advantages will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings and claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present disclosure and the advantages thereof, reference is now made to the following brief description, taken in connection with the accompanying drawings and detailed description, wherein like reference numerals represent like parts.

FIG. **1** shows a handset self diagnostics system according to an embodiment of the present disclosure.

FIG. **2** shows a block diagram of a handset user interface according to an embodiment of the present disclosure.

FIG. **3** shows a flow chart of a method for handset self diagnostics according to an embodiment of the present disclosure.

FIG. **4** shows an illustrative wireless communications system.

FIG. **5** shows a block diagram of an illustrative handset.

FIG. **6** shows a diagram of an illustrative software configuration for a handset.

FIG. **7** shows an exemplary general purpose computer system suitable for implementing the several embodiments of the disclosure.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

It should be understood at the outset that although an exemplary implementation of one embodiment of the present disclosure is illustrated below, the present system may be implemented using any number of techniques, whether currently known or in existence. The present disclosure should in no way be limited to the exemplary implementations, drawings, and techniques illustrated below, including the exemplary design and implementation illustrated and described herein, but may be modified within the scope of the appended claims along with their full scope of equivalents.

To reduce expenses and customer dissatisfaction when a handset is at a customer service center or at a handset manufacturer, embodiments of the present disclosure enable a handset user to perform self-diagnosis on a handset. The user may use the handset to access diagnostic data to correct a handset problem. Unlike typical settings information, the present system enables the user to access diagnostic data on the handset. An example of such diagnostic data may be codes or information related to dropped calls. Such information is maintained on the handset, but not readily available to the handset user without an application provided by some embodiments of the present disclosure.

In some embodiments, the handset user may use a personal computer communicating with the handset to correct handset problems. For example, if the user cannot correct problems by using the handset, the user may use the personal computer to correct the problem. In other embodiments of the present disclosure, when the handset has a problem making calls or cannot otherwise communicate with the wireless telecommunications network, the user may use the personal computer as a proxy to promote communication between the handset and a customer service system of the carrier. This communication with the customer service system, either directly or via the user's personal computer, may assist in correcting the handset communication or other problems.

FIG. **1** depicts a handset self diagnostics system **100** according to an embodiment of the present disclosure. The system **100** includes a handset **102**, which includes the diagnostic engine **104**. The handset **102** is described in more detail below with reference to FIGS. **4-6**. The system **100** shows only one handset for the purpose of illustration, but the system **100** may include any number of handsets.

The handset **102** also includes a handset application **106**, which includes a handset user interface **108**. The handset application **106** is software that includes the handset user interface **108** which may be a GUI (graphical user interface) that enables a user of the handset **102** to access diagnostic data from the diagnostic engine **104** on the handset **102** to assist the user to operate the handset **102**. Diagnostic data is information related to the operation of the handset **102**, and may include, but is not limited to, dropped calls information, error logs, records of problems, CPU or processor activity or usage, system level, or information other than handset settings. Handset settings and settings related information are typically more readily accessible to users than diagnostic data.

The handset **102** may also include a user manual **140**. The user manual **140** may be located on the handset **102**, on the computer **110**, and/or on a diagnostic computer. A comprehensive user manual **140** for the handset **102** is not usually available on handsets such mobiles phones or personal digital assistants. Similar to help options on personal computer applications, embodiments of the present disclosure provide the user manual **140** on the handset **102**, the computer **110**, or a diagnostic computer so that a handset user has it readily available as a reference, in lieu of a paper version of the user manual **140** which is typically not kept with the handset **102**. The handset **102** could internally use SMS (Short Message Service) for various functions including retrieving and presenting the user manual **140** and/or other applications.

The handset **102** may communicate with a computer **110**, which may be the handset user's computer, but is not a computer operated by the wireless telecommunication provider or handset manufacturer. The handset **102** may communicate with the computer **110** wirelessly or by a wired connection. The computer **110** includes a computer application **112**, which includes a user interface **114**. The computer application **112** includes the computer user interface **114** to enable the user of the handset **102** to access diagnostic data from the diagnostic engine **104** on the handset **102** to assist the user to operate the handset **102**. The computer application **112** may include components similar to the components in the handset application **106**. However, the computer application **112** may provide additional assistance and functionality beyond that of the handset application **106**. For example, the computer application **112** may provide or instruct the diagnostic engine **104** to execute additional diagnostic tests on the handset **102**. For example, the handset may not have been provided with the most recent or updated diagnostic information or testing capabilities. The computer application **112** may have or be able to easily obtain, such as by downloading via the Internet, specific or additional capabilities to access different systems in the handset **102**.

The computer **110** also includes a knowledge base **116**. The knowledge base **116** is a database that may include records regarding specific handset problems and specific actions that the computer **110** uses to assist the user with each specific handset problem. Each time a handset problem is solved, the computer **110** may update the knowledge base **116**. Although not shown in FIG. **1**, the handset **102** may also include the knowledge base **116**. However, the knowledge base **116** on the handset **102** may be limited relative to the knowledge base **116** on the computer **110** because of storage limitations on the handset **102**. The knowledge base **116** on the computer **110** may include or be able to download additional or updated records regarding specific handset problems to which the handset application **106** may not have access.

Additionally, the computer **110** includes a proxy component **118**. When the handset **102** is inoperable or unable to communicate with a wireless network **120**, the user of the handset **102** may use the computer **110** to communicate with the handset **102**. The user may use the proxy component **118** on the computer **110** to promote communication between the handset **102** and a customer service system **122** for a telecommunications carrier system, or carrier system **124**. The proxy component **118** allows the carrier system **124** access to the handset **102** via the wireless network **120**, or an alternative communication system, such as the Internet **126**.

The handset **102** may also communicate directly with the carrier system **124** through the wireless network **120**. The carrier system **124** includes the customer service system **122** and a carrier diagnostic computer **128**. A diagnostic computer is a computer for communicating with the diagnostic engine **104** and assisting the user to operate the handset **102**. The diagnostic computer **128** may assist the user to operate the handset **102** by sending software or firmware to the handset **102**. The carrier diagnostic computer **128** is a diagnostic computer used by the carrier system **124**. The user of the handset **102** may communicate with the customer service system **122** to obtain assistance with the handset **102**. The customer service system **122** may use the carrier diagnostic computer **128** to diagnose the handset **102** to assist the user with the handset **102**.

The carrier diagnostic computer **128** may include components, such as the knowledge base **116**, similar to the components in the computer **110**. However, the carrier diagnostic computer **128** may have additional or updated diagnostic information or capabilities that the computer **110** and the handset application **106** may not have. Also, the carrier diagnostic computer **128** may have specific capabilities to access different or additional systems in the handset **102**.

The carrier diagnostic computer **128** includes a diagnostic component **130**, an encoder **132** and a decoder **134**. The diagnostic component **130** may be, for example, a software application used to promote communicate with the diagnostic engine **104**. It should be appreciated that each different handset may include a different diagnostic engine and consequently each handset may require a different application or interface to communicate with the diagnostic engine of that handset. Also each diagnostic engine may generate or record diagnostic data that is proprietary and specific to a particular handset. The manufacturers may develop specific tools to communicate with the proprietary diagnostic engine on each of the different handsets they manufacture. These systems are typically not provided to the telecommunications carriers.

According to the present disclosure, the encoder **132** and decoder **134** may be systems provided by the manufacturer that are capable of communicating with the diagnostic engine **104** on the handset **102**, either directly or indirectly. In some embodiments, the diagnostic component **130** may be a tool or interface to promote communication with the diagnostic engine **104** by employing the capabilities of the encoder and decoder **132** and **134**. That is, multiple encoders and decoders **132** and **134**, each capable of communicating with different diagnostic engines **104** on different handsets **102**, might be provided on the carrier's diagnostic computer **128**. Although only one encoder and decoder **132**, **134** are shown, multiple encoders and decoders **132**,**134** might be present. The diagnostic component **130** might also provide a common GUI

(graphical user interface) for customer service representatives to work the multiple handsets **102** and diagnostic engines **104**.

The diagnostic component **130**, along with other systems, might provide the communication capabilities to promote remote communication with the handset **102** and diagnostic engine **104**. For example, the diagnostic component **130** might send scripts or other inputs to the diagnostic engine **104** that were obtained from the encoder **132**. Communications received by the diagnostic component **130** from the diagnostic engine **104** might be referred to the decoder **134** for interpretation. The encoder **132** may change signals, communications, or requests from the diagnostic component **130** into code, or signals understandable to the diagnostic engine **104**. Similarly, the decoder **134** may change code, data, or instructions received from the diagnostic engine **104** back into data understandable to a diagnostic computer **128** or diagnostic component **130**.

The diagnostic component **130**, encoders **132**, and/or decoders **134** might be provided with a standard interface or API (application programming interface) so different manufacturers' encoders and decoders **132**, **134** may communicate with the diagnostic component **130**. Other ways of handling the communication between the diagnostic component **130**, encoders **132**, and/or decoders **134** to promote communication with the diagnostic engine **104** will readily suggest themselves to one skilled in the art in light of the present disclosure. Additional information on the diagnostic component **130**, encoders **132**, and/or decoders **134** is provided in co-pending U.S. patent application Ser. No. 11/535,283, filed Sep. 26, 2006, entitled "Remote Handset Diagnostics," by Sudheer Kumar Peddireddy, et al., referenced above, which is incorporated herein by reference.

The carrier diagnostic computer **128** may use the knowledge base **116** accessed by the carrier diagnostic computer **128** to assist the user to operate the handset **102**. Each time a handset problem is solved, the carrier diagnostic computer **128** may update the knowledge base **116** accessed by the carrier diagnostic computer **128**.

The handset **102** user may also obtain assistance directly from the manufacturer via the wireless network **120**, or, when the handset **120** is inoperable, may communicate indirectly with the manufacturer system **136** using the computer **110** via the Internet **126**. The manufacturer system **136** may include a manufacturer diagnostic computer **138**, which may be similar to the carrier diagnostic computer **128**. The manufacturer diagnostic computer **138** is a diagnostic computer used by the handset manufacturer. The manufacturer diagnostic computer **138** may include components substantially similar to the components in the carrier diagnostic computer **128**, such as the diagnostic component **130**, the encoder **132**, the decoder **134**, and the knowledge base **116**.

The handset manufacturer may have additional or updated diagnostic information or capabilities that the carrier diagnostic computer **128**, the computer **110**, or the handset application **106** may not have. Further, the manufacturer diagnostic computer **138** may have specific capabilities to access different systems or functionality in the handset **102**. The knowledge base **116** on the manufacturer diagnostic computer **138** may include additional or updated records regarding specific handset problems that the carrier diagnostic computer **128**, the computer **110**, or the handset application **106** may not have.

Turning now to FIG. **2**, a block diagram of a handset user interface is depicted according to an embodiment of the present disclosure. These illustrative handset user interfaces may be examples of the handset user interfaces **108** that may be displayed on the handset **102** by the handset application **106**. The user interfaces depicted in FIG. **2** are examples of the handset user interfaces **108** that may be displayed in response to a sequence of user selections made by a user experiencing a problem with a camera, for example, a flash problem for a camera. Although flash related problems may be diagnostics information or user settings depending on the handsets, flash problems are provided as an example of a diagnostic problem that may require the use of diagnostic data to correct. However, as used herein, diagnostic data is any information that is normally not available to a user through standard settings, and may include, but is not limited to, information about an operating system, hardware, software, firmware, system serial numbers, dropped calls, other proprietary information, or any other non-setting data.

The first options that may be displayed to the user of the handset **102** by the handset application **106** may be a diagnostics **202** option and a user manual **204** option. By selecting the diagnostics **202** option, the handset application **106** may display the diagnostic portion of the handset application **106**, which provides further options related to handset diagnostics, such as the options displayed under a "select module" **206** heading.

The options displayed under the "select module" **206** heading may include a camera **210** option, a SMS **212** option, a pix message **214** option, a voice call **216** option, and a phonebook **218** option. By selecting the camera **210** option, the user may select further options related to a camera and a camera controller. By selecting the SMS **212** option, the user may select further options related to a short message service for providing alphanumeric messaging. By selecting the pix message **214** option, the user may select further options related to digital picture messages. By selecting the voice call **216** option, the user may select further options related to audio messages and call settings. By selecting the phonebook **218**, the user may select further options related to a database of telephone numbers, associated names and so on.

For example, if the user selects the camera **210** option, the handset application **106** may display a "select problem area" **220** heading. The options displayed under the "select problem area" **220** heading may include a resolution **222** option, a flash **224** option, a zoom **226** option, a shutter sound **228** option, and a fun frame **230** option. By selecting the resolution **222** option, the user may select further options related to the level of detail for digital pictures taken by the camera. By selecting the flash **224** option, the user may select further options related to the light produced by the flash to help illuminate a scene for photographing. By selecting the zoom **226** option, the user may select further options related to adjusting the lens magnification. The shutter sound **228** option may provide options related to the sound made by the device when taking a picture. The fun frame **230** may provide options related to a selection of digital frames that may be displayed around the digital pictures taken by the camera.

If the user selects the flash **224** option, the handset application **106** may display, for example, the heading "Current flash setting is off. Do you want to turn on the flash?" **232**. The handset application **106** may respond to the selection of the flash **224** option by executing the first diagnostic engine **104**, which may obtain diagnostic data for the handset **102**, such as handset **102** diagnostic data. The diagnostic data obtained by the diagnostic engine **104** may indicate that the flash option for the camera is inoperative because the flash setting is set to off. In response to this indication, the handset application **106** may display the message "Current flash setting is off. Do you want to turn on the flash?" **232**. In response to the message **232**, the user may select the no **234** or the yes **236** options.

The user may select no **234** if the user wants the flash to stay off or if the user has already tried unsuccessfully to turn the flash on. The handset application **106** might respond to the user selection of the no **234** option by displaying a message "Reporting problem to customer service. A representative will contact you." **238**. At this point, the handset **102** may report the flash problem for the camera to the customer service system **122**. A customer service representative may respond by contacting the user immediately, or at a later time.

Alternatively, the user may select the yes **236** option in response to the message "Current flash setting is off. Do you want to turn on the flash?" **232**. For this example, the handset application **106** responds to this selection by displaying a message "Camera flash set to on. Please start camera and check flash operation." **240**. After displaying the message **240**, the handset application **106** displays a message "Is camera flash working now?" **242** and both a Flash not working **244** option and a Flash working **246** option, might then be displayed. If the user responds to the message **242** by selecting the Flash working **246** option, the process depicted in FIG. **2** terminates. If the user responds to the message **242** by selecting the flash not working **244** option, the handset application **106** responds to this user selection by displaying the message "Reporting problem to customer service. A representative will contact you." **238**. After reporting the problem to customer service, the process depicted in FIG. **2** terminates.

By selecting the user manual **204** option, the handset application **106** may display the help portion of the handset application **106**, which includes further options related to user manual data, such as the options displayed under a "user manual query" **208** heading. User manual data is a set of information provided by the handset manufacturer that instructs the user how to operate the handset **102**.

In another example, if the user selects the user manual **204** option, the handset application **106** may display the options headed by the message "user manual query" **208**. The options headed by the message "user manual query" **208** may include a message "please input your problems" **248**. In response to the message **248**, the user may enter a response "camera flash not working" **250**, and select an enter **252** option. In response to the user selecting the enter **252** option, the handset application **106** obtains user manual data from the user manual **140**. The user manual **140** may be located on the handset **102**, on the computer **110**, or on a diagnostic computer. The user manual **140** may be accessed directly, or may be accessed indirectly through the computer **110** or through the computer **110** and the proxy component **118**.

In response to the user selecting the enter **252** option after entering the response **250**, the handset application **106** may query the data from the user manual **140** and display a message "user manual camera flash menu" **254**. The user interface headed by the message "user manual camera flash menu" **254** may include a message "camera flash—on enables flash—off disables flash" **256**, and both an on **258** option and an off **260** option. In response to the message **256**, the user may select the on **258** option to set the flash on for the camera. In response to the user selecting the on **258** option, the handset application **106** may display the message "Camera flash set to on. Please start camera and check flash operation." **240**. After displaying the message **240**, the handset application **106** displays the message "Is camera flash working now"? **242** and both a flash not working **244** option and a flash working **246** option. If the user responds to the message **242** by selecting the flash working **246** option, the process depicted in FIG. **2** terminates. If the user responds to the message **242** by selecting the flash not working **244** option, the handset application **106** responds to this user selection by displaying the message "Reporting problem to customer service. A representative will contact you." **238**. At this point, the handset **102** reports the flash problem for the camera to the customer service system **122**, and the process depicted in FIG. **2** terminates. Although not shown, the interfaces illustrated in FIG. **2** may also include the settings interfaces and capabilities typically found on handsets **102**.

Turning now to FIG. **3**, a flowchart of a method for handset self diagnostics is depicted according to an embodiment of the present disclosure. The method for handset self diagnostics may begin when the user accesses the handset application **106** with a request for assistance to operate the handset **102**. The user may request assistance to operate the handset **102** because the user may lack knowledge to operate all the various features of the handset **102**. Such a request for assistance may often be met by offering the user access to the user manual **140**. The user may also request assistance to operate the handset **102** due to a handset problem, which may be caused by handset software, handset hardware, or a combination of the handset software and the handset hardware. The boxes in the flowchart depicted in FIG. **3** may be executed either in varying orders depending on the selections made by the user of the handset **102**.

At block **302**, the user may obtain diagnostics data by accessing the handset application **106** and user interfaces **108**. The diagnostic engine **104** on the handset **102** is able to obtain diagnostic data from the handset which may be used to resolve the handset related problems. At block **304**, the user may obtain settings data and/or user manual data to assist the user in resolving the problem with the handset. Finally, at block **306**, when the diagnostics data, settings data and manual data are unable to assist the user in resolving the handset issue, the user may communicate with customer service regarding the problem. When the handset is unable to communicate, or make a call, the user may connect the handset to the user's computer **110** wirelessly or via wired connection and thereafter employ the user's computer **110** as a proxy to remotely communicate with the carrier system **124** and customer service to obtain assistance in resolving the problem.

It should be appreciated that the diagnostic and other data and information collected may be stored on a storage device on the handset **102** and periodically retrieved and communicated to other systems. Alternatively, the diagnostic and other data and information might be collected from the handset **102** and then transmitted without being stored, or some data or portions of the data might be stored, temporarily or otherwise, and then transmitted to the relevant systems.

FIG. **4** shows a wireless communications system including the handset **102**. FIG. **4** depicts the handset **102**, which is operable for implementing aspects of the present disclosure, but the present disclosure should not be limited to these implementations. Though illustrated as a mobile phone, the handset **102** may take various forms including a wireless handset, a pager, a personal digital assistant (PDA), a portable computer, a tablet computer, or a laptop computer. Many suitable handsets combine some or all of these functions. In some embodiments of the present disclosure, the handset **102** is not a general purpose computing device like a portable, laptop or tablet computer, but rather is a special-purpose communications device such as a mobile phone, wireless handset, pager, or PDA.

The handset **102** includes a display **402** and a touch-sensitive surface or keys **404** for input by a user. The handset **102** may present options for the user to select, controls for the user to actuate, and/or cursors or other indicators for the user to

direct. The handset **102** may further accept data entry from the user, including numbers to dial or various parameter values for configuring the operation of the handset. The handset **102** may further execute one or more software or firmware applications in response to user commands. These applications may configure the handset **102** to perform various customized functions in response to user interaction.

Among the various applications executable by the handset **102** are a web browser, which enables the display **402** to show a web page. The web page is obtained via wireless communications with a cell tower **406**, a wireless network access node, or any other wireless communication network or system. The cell tower **406** (or wireless network access node) is coupled to a wired network **408**, such as the Internet. Via the wireless link and the wired network, the handset **102** has access to information on various servers, such as a server **410**. The server **410** may provide content that may be shown on the display **402**.

FIG. **5** shows a block diagram of the handset **102**. The handset **102** includes a digital signal processor (DSP) **502** and a memory **504**. As shown, the handset **102** may further include an antenna and front end unit **506**, a radio frequency (RF) transceiver **508**, an analog baseband processing unit **510**, a microphone **512**, an earpiece speaker **514**, a headset port **516**, an input/output interface **518**, a removable memory card **520**, a universal serial bus (USB) port **522**, an infrared port **524**, a vibrator **526**, a keypad **528**, a touch screen liquid crystal display (LCD) with a touch sensitive surface **530**, a touch screen/LCD controller **532**, a charge-coupled device (CCD) camera **534**, a camera controller **536**, and a global positioning system (GPS) sensor **538**.

The DSP **502** or some other form of controller or central processing unit operates to control the various components of the handset **102** in accordance with embedded software or firmware stored in memory **504**. In addition to the embedded software or firmware, the DSP **502** may execute other applications stored in the memory **504** or made available via information carrier media such as portable data storage media like the removable memory card **520** or via wired or wireless network communications. The application software may comprise a compiled set of machine-readable instructions that configure the DSP **502** to provide the desired functionality, or the application software may be high-level software instructions to be processed by an interpreter or compiler to indirectly configure the DSP **502**.

The antenna and front end unit **506** may be provided to convert between wireless signals and electrical signals, enabling the handset **102** to send and receive information from a cellular network or some other available wireless communications network. The RF transceiver **508** provides frequency shifting, converting received RF signals to baseband and converting baseband transmit signals to RF. The analog baseband processing unit **510** may provide channel equalization and signal demodulation to extract information from received signals, may modulate information to create transmit signals, and may provide analog filtering for audio signals. To that end, the analog baseband processing unit **510** may have ports for connecting to the built-in microphone **512** and the earpiece speaker **514** that enable the handset **102** to be used as a cell phone. The analog baseband processing unit **510** may further include a port for connecting to a headset or other hands-free microphone and speaker configuration.

The DSP **502** may send and receive digital communications with a wireless network via the analog baseband processing unit **510**. In some embodiments, these digital communications may provide Internet connectivity, enabling a user to gain access to content on the Internet and to send and receive e-mail or text messages. The input/output interface **518** interconnects the DSP **502** and various memories and interfaces. The memory **504** and the removable memory card **520** may provide software and data to configure the operation of the DSP **502**. Among the interfaces may be the USB interface **522** and the infrared port **524**. The USB interface **522** may enable the handset **102** to function as a peripheral device to exchange information with a personal computer or other computer system. The infrared port **524** and other optional ports such as a Bluetooth interface or an IEEE 802.11 compliant wireless interface may enable the handset **102** to communicate wirelessly with other nearby handsets and/or wireless base stations.

The input/output interface **518** may further connect the DSP **502** to the vibrator **526** that, when triggered, causes the handset **102** to vibrate. The vibrator **526** may serve as a mechanism for silently alerting the user to any of various events such as an incoming call, a new text message, and an appointment reminder.

The keypad **528** couples to the DSP **502** via the interface **518** to provide one mechanism for the user to make selections, enter information, and otherwise provide input to the handset **102**. Another input mechanism may be the touch screen LCD **530**, which may also display text and/or graphics to the user. The touch screen LCD controller **532** couples the DSP **502** to the touch screen LCD **530**.

The CCD camera **534** enables the handset **102** to take digital pictures. The DSP **502** communicates with the CCD camera **534** via the camera controller **536**. The GPS sensor **538** is coupled to the DSP **502** to decode global positioning system signals, thereby enabling the handset **102** to determine its position. Various other peripherals may also be included to provide additional functions, e.g., radio and television reception.

FIG. **6** illustrates a software environment **602** that may be implemented by the DSP **502**. The DSP **502** executes operating system drivers **604** that provide a platform from which the rest of the software operates. The operating system drivers **604** provide drivers for the handset hardware with standardized interfaces that are accessible to application software. The operating system drivers **604** include application management services ("AMS") **606** that transfer control between applications running on the handset **102**. Also shown in FIG. **6** are a web browser application **608**, a media player application **610**, Java applets **612**, and the diagnostic engine **104**. The web browser application **608** configures the handset **102** to operate as a web browser, allowing a user to enter information into forms and select links to retrieve and view web pages. The media player application **610** configures the handset **102** to retrieve and play audio or audiovisual media. The Java applets **612** configure the handset **102** to provide games, utilities, and other functionality. The diagnostic engine **104** is a component that may generate or record information related to the operation of the handset **102** as discussed above.

One or more applications or systems described above may be implemented on any general-purpose computer with sufficient processing power, memory resources, and network throughput capability to handle the necessary workload placed upon it. FIG. **7** illustrates a typical, general-purpose computer system which may be used as the computer **110**, carrier and/or manufacturer diagnostic computers **128**, **138** suitable for implementing one or more embodiments disclosed herein. The computer system **780** includes a processor **782** (which may be referred to as a central processor unit or CPU) that is in communication with memory devices including secondary storage **784**, read only memory (ROM) **786**, random access memory (RAM) **788**, input/output (I/O) **790**

devices, and network connectivity devices **792**. The processor may be implemented as one or more CPU chips.

The secondary storage **784** is typically comprised of one or more disk drives or tape drives and is used for non-volatile storage of data and as an over-flow data storage device if RAM **788** is not large enough to hold all working data. Secondary storage **784** may be used to store programs which are loaded into RAM **788** when such programs are selected for execution. The ROM **786** is used to store instructions and perhaps data which are read during program execution. ROM **786** is a non-volatile memory device which typically has a small memory capacity relative to the larger memory capacity of secondary storage. The RAM **788** is used to store volatile data and perhaps to store instructions. Access to both ROM **786** and RAM **788** is typically faster than to secondary storage **784**.

I/O **790** devices may include printers, video monitors, liquid crystal displays (LCDs), touch screen displays, keyboards, keypads, switches, dials, mice, track balls, voice recognizers, card readers, paper tape readers, or other well-known input devices. The network connectivity devices **792** may take the form of modems, modem banks, ethernet cards, universal serial bus (USB) interface cards, serial interfaces, token ring cards, fiber distributed data interface (FDDI) cards, wireless local area network (WLAN) cards, radio transceiver cards such as code division multiple access (CDMA) and/or global system for mobile communications (GSM) radio transceiver cards, and other well-known network devices. These network connectivity **792** devices may enable the processor **782** to communicate with an Internet or one or more intranets. With such a network connection, it is contemplated that the processor **782** might receive information from the network, or might output information to the network in the course of performing the above-described method steps. Such information, which is often represented as a sequence of instructions to be executed using processor **782**, may be received from and outputted to the network, for example, in the form of a computer data signal embodied in a carrier wave

Such information, which may include data or instructions to be executed using processor **782** for example, may be received from and outputted to the network, for example, in the form of a computer data baseband signal or signal embodied in a carrier wave. The baseband signal or signal embodied in the carrier wave generated by the network connectivity **792** devices may propagate in or on the surface of electrical conductors, in coaxial cables, in waveguides, in optical media, for example optical fiber, or in the air or free space. The information contained in the baseband signal or signal embedded in the carrier wave may be ordered according to different sequences, as may be desirable for either processing or generating the information or transmitting or receiving the information. The baseband signal or signal embedded in the carrier wave, or other types of signals currently used or hereafter developed, referred to herein as the transmission medium, may be generated according to several methods well known to one skilled in the art.

The processor **782** executes instructions, codes, computer programs, scripts which it accesses from hard disk, floppy disk, optical disk (these various disk based systems may all be considered secondary storage **784**), ROM **786**, RAM **788**, or the network connectivity devices **792**.

While several embodiments have been provided in the present disclosure, it should be understood that the disclosed systems and methods may be embodied in many other specific forms without departing from the spirit or scope of the present disclosure. The present examples are to be considered as illustrative and not restrictive, and the intention is not to be limited to the details given herein, but may be modified within the scope of the appended claims along with their full scope of equivalents. For example, the various elements or components may be combined or integrated in another system or certain features may be omitted, or not implemented.

Also, techniques, systems, subsystems and methods described and illustrated in the various embodiments as discrete or separate may be combined or integrated with other systems, modules, techniques, or methods without departing from the scope of the present disclosure. Other items shown or discussed as directly coupled or communicating with each other may be coupled through some interface or device, such that the items may no longer be considered directly coupled to each other but may still be indirectly coupled and in communication, whether electrically, mechanically, or otherwise with one another. Other examples of changes, substitutions, and alterations are ascertainable by one skilled in the art and could be made without departing from the spirit and scope disclosed herein.

What is claimed is:

**1**. A system for handset diagnostics, comprising:

a handset;

a diagnostic engine on the handset configured to obtain diagnostic data for the handset from a customer service system; and

a first application on the handset comprising at least one user interface that is configured to use the diagnostic data to assist a user of the handset to operate the handset;

a second application on a computer configured to:

when said second application is unable to enable the handset to communicate via the carrier wireless network, using another computer of the user as a proxy to promote communication between the handset and a customer service system of the carrier wireless network to enable the handset to communicate via the carrier wireless network, the customer service system comprising a tool configured to obtain the diagnostic data.

**2**. The system of claim **1**, wherein the handset is selected from a group consisting of a mobile phone, a wireless handset, a personal digital assistant, a portable computer, a tablet computer, and a laptop computer.

**3**. The system of claim **1**, wherein the diagnostic data includes error logs and dropped calls information which are accessible to the user of the handset only by the application.

**4**. The system of claim **1**, wherein the application is configured to use settings data to assist the user to operate the handset.

**5**. The system of claim **1**, wherein the application is configured to use user manual data to assist the user to operate the handset.

**6**. The system of claim **1**, wherein the user interface is configured to provide an option for the user to contact a carrier customer service system for the handset when the user requires assistance to operate the handset.

**7**. A system for handset diagnostics, comprising:

a handset;

a diagnostic engine on the handset configured to obtain diagnostic data for the handset from a customer service system;

a first application on the handset comprising at least one user interface that is configured to use the diagnostic data to assist a user of the handset to operate the handset; and

a second application on a computer configured to:

when said second application is unable to enable the handset to communicate via the carrier wireless network, using another computer of the user as a proxy to promote

communication between the handset and a customer service system of the carrier wireless network to enable the handset to communicate via the carrier wireless network, the customer service system comprising a tool configured to obtain the diagnostic data.

**8**. The system of claim **7**, wherein the diagnostic data used to assist the user to operate the handset is further configured to be used to assist the user with handset problems.

**9**. The system of claim **7**, wherein the computer and the handset are configured to communicate via a communication channel selected from a group consisting of a wired connection, a wireless connection, an infra-red connection, and an optical connection.

**10**. The system of claim **7**, further comprising:

a carrier customer service system; and

a proxy component configured on the computer of the user to promote communication between the handset and the carrier customer service system to enable the carrier customer service system to assist the user to operate the handset.

**11**. The system of claim **10**, wherein the carrier customer service system includes a diagnostics component configured to communicate with the diagnostic engine on the handset via the computer of the user and the proxy component.

**12**. The system of claim **10**, wherein the diagnostic data includes error logs and dropped calls information which are accessible to the user of the handset only by the application, wherein the application is configured to use user manual data to assist the user to operate the handset, and wherein the carrier customer service system is configured to use the diagnostic data to assist the user to operate the handset.

**13**. The system of claim **10**, further comprising an encoder and a decoder configured to promote communication between the carrier customer service system and the handset diagnostic engine, the encoder operable to encode requests for diagnostics data from the carrier customer service system to the diagnostics engine and the decoder operable to decode the diagnostic data received by the carrier customer service system from the handset diagnostic engine.

**14**. The system of claim **7**, further comprising:

a customer service system of the manufacturer of the handset; and

a proxy component configured on the computer of the user to promote communication between the handset and the customer service system of the manufacturer to enable the customer service system of the manufacturer to assist the user to operate the handset.

**15**. A method for handset diagnostics, comprising:

obtaining, with a diagnostic engine on a handset, diagnostic data for the handset from a customer service system;

selecting an application on the handset to use the diagnostic data to assist a user of the handset to operate the handset;

when said handset is inoperable to communicate via a carrier wireless network, communicating with the handset using a computer of a user of the handset;

selecting an application using the computer to obtain diagnostic data from the handset to enable the handset to communicate via the carrier wireless network;

when the application is unable to enable the handset to communicate via the carrier wireless network, using the computer of the user as a proxy to promote communication between the handset and a customer service system of the carrier wireless network to enable the handset to communicate via the carrier wireless network, the customer service system comprising a tool operable to obtain the diagnostic.

**16**. The method of claim **15**, wherein the application is on the computer.

**17**. The method of claim **15**, wherein the computer of the user of the handset is coupled to communicate with the handset via a communication channel selected from a group consisting of a wired connection, a wireless connection, an infrared connection, and an optical connection.

**18**. The method of claim **15**, wherein the application includes a help portion and a diagnosis portion, wherein the diagnosis portion includes error logs and dropped calls information which are accessible to the user of the handset only by the application and settings data to enable the handset to communicate via the carrier wireless network, and wherein the help portion includes user manual data for the handset.

**19**. The method of claim **18**, wherein the application on the computer accesses a knowledge base for the handset to enable the handset to communicate via the carrier wireless network.

**20**. The method of claim **15**, wherein when the handset is operable to communicate via the carrier wireless network, the method further includes:

the user selecting the application using the computer to assist the user to operate the handset; and

when the user still requires assistance to operate the handset, selecting for the handset to communicate with the customer service system of the carrier wireless network to assist the user to operate the handset.

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